

SIGNATURE DISGUISE

BY CHANGE OF SLANT

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Number Eight in the Series of
Studies in Questioned Documents

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TABLE OF CONTENTS

Protocol of the study	5
The present paper	7
The tables	8
Table one: Observations of slant	9
Table two: Letter connection	11
Table three: Size ratio of letters	12
Table four: Pressure and base line	14
Table five: Horizontal expansion	15
Table six: Correlation of other changes to slant	18
Concerning speed	21
A study by James Regent	22
A study by John Allan Jamieson	24
Bibliography	26
Illustrations	27

SIGNATURE DISGUISE BY CHANGE OF SLANT

I. PROTOCOL OF THE STUDY

At the 1991 Annual Document Examination Seminar in San Francisco, we had the 13 people attending the Basic Principles Segment participate in an exercise in signature disguise. So that no one's authentic signature would be subject to possible misuse down the road, everyone wrote the name "Napoleon Bonaparte" as if it were one's own signature.

Each person was given an 8 X 14 page divided horizontally into 8 equal parts. The top space had a photocopy of my signing the name Napoleon Bonaparte. The remaining seven spaces were each identified with a random three digit number. I made a master key showing which number was in which position for each sheet. The intent was that the various signatures by each participant would be duplicated, cut into single pieces and the participants challenged to sort all 91 signatures as to maker and the intended disguise. I realized that would be an enormous overnight task, so they were simply given copies of the uncut sheets.

Each of the seven blank spaces were used for the following writings of the signature:

The first: Written in the natural style;

The second: Disguise only by change of slant;

The third: Disguise only by change of size;

The fourth: Disguise only by change of zone proportions;

The fifth: Disguise only by change of form:

The sixth: Disguise only by writing with the opposite hand; and

The seventh: An imitation of my writing at the top.

The purposes of this experiment were as follows:

1. That the participants might experience what the making of a handwritten forgery is, how it alters handwriting, which features are harder to alter and what clues appear when writing is deliberately altered;
2. To provide testing material for the students;
3. To provide material for later in-depth study of which features change unintentionally when a specific change is made intentionally; and
4. To verify other published studies in the matter.

Finally, the features to be studied were intended potentially to cover all physiological handwriting features as categorized by de Ste. Colombe and Saudek, supplemented as needed by reference to other authors. As a practical matter, when it came to actually studying the change by slant, the study had to be limited to those features given later in the paper. The reasons for this limitation were that these are fairly common and customary observations, and they promised upon preliminary observation to offer easily verifiable changes. Additionally they could be sufficiently observed without magnification or special measuring tools.

Since only 13 people participated, the study serves to illustrate and confirm previous assumptions in handwriting identification rather than to prove them conclusively. If several of us around the country were to undertake such an experiment, using the exact same protocol, the one or two dozen writers each of us would direct in making the study would amount to a 100-200 population, substantial enough for confirmed scientific results. If anyone is interested, please let me know.

II. THE PRESENT PAPER

This is intended to be the first, and most extensive, of six papers in a series, each covering one of the signature disguises made in the experiment. The thirteen natural, genuine style signatures are reproduced along with the matching disguise by slant. Thus the reader can confirm or correct my observations and conduct any further observations desired.

Several tables give the observations made. The title of each table is self-explanatory. The tables are accompanied by explanatory notes, further observations and conclusions drawn. Cautions in drawing conclusions were paramount in mind, since, as noted above, the study is limited. One fact not given was the handedness of the writers. That could be of importance and should be included in any further, extensive study.

The paper ends with a critique of two studies of handwriting disguise by slant which were published in the professional literature.

III. THE TABLES

Table One has six columns. The first identifies by number the writer of each sample reproduced. "True slant" means that in the genuine writing, while "False slant" means that chosen in the disguised writing. The dominant slant is simply identified as Left, Vertical or Right. As indicated, only two writers showed an even mixture of two slants. "True in the false" means where the true slant appears, or most nearly appears, within the disguised.

The purpose of the last two columns is to investigate where the examiner might look for clues to the possible identification of the writer's true slant and where one should

expect the false to be most evident. The results in these two columns are strongly in agreement with what the experimental graphologists say.

TABLE ONE: OBSERVATIONS OF SLANT

WRITER	TRUE SLANT	FALSE SLANT	TRUE IN THE FALSE	MOST SUCCESSFUL CHANGE: WHICH LETTERS OR ZONE; UP STROKES VS DOWN
1	Right	Left	1st "e"	Capitals; LZ; "o" of 1st name; down strokes
2	Vertical	Left	'e's" of 1st name	"Na"; "Bon"; "p" and "t" of 2nd name; down strokes
3	Right	Vertical	'e's"; 1st "a" of 2nd name	Capitals; LZ; "I"; down strokes
4	Right	Left	Nowhere	Capitals; "t"; down strokes
5	Right	More to right	"B"; "on" and "ona"	"Nap"; LZ; final "e"; down strokes
6	Right	Vertical	Ovals	Capitals; UZ; LZ; down strokes
7	Vertical	Left	Final "e"	First half of words; up & down strokes equally
8	Right	Vertical	Final "e"	"N"; UZ; LZ; down strokes
9	Right	More to right	Final letters	All other letters; up & down strokes equally
10	Vertical/Right	More to right	"po"; 1st "e"; MZ 2nd name	Capitals; UZ; up strokes
11	Right	Vertical	"N"; final "e"	Lower case of 1st name; final "e"; down strokes
12	Right	Vertical/Left	Most ovals	"B"; LZ; "te"; down strokes
13	Right	Vertical	MZ in 2nd half of names	Capitals; "I"; down strokes

The two writers, numbers 1 and 4, who changed from a right to a left slant, did so to about an equal amount to either side of vertical. Writer 8 slanted capital "B" leftward also to an equal degree. However, writer 12 did not alter to an equal degree leftward. Falcon suggested that a person altering slant from left to right or right to left or using styles with opposite slants will tend to go to equal degrees to either side of vertical. My experience has

supported this expectation. Systematic, controlled studies could confirm what the exact statistical expectation should be for this phenomenon.

TABLE TWO: LETTER CONNECTION

WRITER	CHANGE IN FORM OF CONNECTION	MORE CONNECTED OR DISCONNECTED	LETTER SPACING: WIDER OR NARROWER
1	Final "n" garland to arcade; t-bar tied	Same	Wider
2	More rigid	Disconnected	Narrower
3	Same	Disconnected	Narrower
4	More rigid	Same	Same
5	More rigid, angular; t-bar L-R final	One less disconnection	Some of each; a wash
6	Curves awkward	One more & one less of each; a wash	Much narrower
7	Same	Same	Proportionately narrower
8	More awkward curves	3 more disconnection & 2 more connections	Same
9	Same	Disconnected	Notably wider
10	Most fluent of all	One more disconnection	Wider
11	Garlands more "drawn"; more rigid movement	Same	Notably more uneven
12	More rigid	Same	Slightly narrower
13	More awkward curves	One more of each; a wash	Narrower

In this and the next table, observations were made with the unaided eye, without magnifiers or measuring tools.

In these samples, more rigidity does not correlate to greater narrowness of letter spacing. However, where rigidity is not present there is a tendency to wider letter spacing. The reason might be the tendency to enlarge graphic gestures when attempting an unaccustomed movement.

TABLE THREE: SIZE RATIO OF LETTERS

WRITER	WHICH LETTER OR ZONE IS TALLER OR SHORTER	WHICH LETTER OR ZONE IS WIDER OR NARROWER
1	LZ shorter	Wider: 1st "p"; "o's"; "I"; t-stem
2	"I" taller	Capitals narrower; ovals wider; stick "I"
3	All slightly shorter	Same
4	Shorter: "B"; "p's"; "R"	Same
5	Taller in this order: MZ; UZ; LZ; capitals	All wider, but "N" retraced
6	A wash	Proportionately wider MZ & UZ but with more retracing
7	All taller	Some narrower
8	Same	Same
9	Taller: final "n"; "B"; "p's"	Wider: same letters and ovals
10	Same	Mostly wider
11	Same	Wider: "I" and t-stem
12	Same	Retracing; lead-in longer: "N"; "B"; t-bar
13	I-stem taller	Capitals narrower; retracing

As always, we consider height (depth in the lower zone) first and consider width in relationship to height. Thus if the height of a letter is reduced while the actual width remains the same, the letter is considered wider, being proportionately so. Thus where it is indicated letters were wider or narrower, it is meant proportionately to the height. Retracing is always the extreme of narrowness, width between the up and down strokes being reduced to zero at the point of retracing.

Change in the width of letter spacing correlated to change in the width of letters themselves when slant was more rightward, but not leftward. The mechanics of a

leftward slant seem to require leftward expansion in order
to make the down stroke at the intended slant.

TABLE FOUR: PRESSURE AND BASE LINE

WRITER	PRESSURE PATTERN	END STROKE	BASE LINE
1	Nothing definite	Less released	More uneven; rise at end
2	Displaced to right	Blunted	More uneven; rising
3	Nothing definite	"eon" more released	More rising
4	Muscle tremor; displaced to right	More blunt	More uneven; rising
5	Displaced to right	Same	More convex
6	Heavier; muscle tremor	Hooked; blunted	Rising
7	Nothing definite	Same	Rising; more uneven
8	Displaced to right	More blunt; hooked	Rising and uneven
9	Lighter in places	More blunt	Uneven and descending
10	Some rightward emphasis	Slightly blunter	Little less rising
11	Nothing definite	Slightly blunter	More uneven
12	Displaced to right	Blunter	Slightly more uneven
13	Muscle tremor	Blunter	More uneven; rising

Each writer was given a black, roller ball pen, so that all would use the same writing tool. The fluid ink of the roller ball does not as clearly show pressure variation as a good quality ballpoint. It also tends to feed ink into the paper fibers whenever the writer hesitates or pauses with penpoint on paper.

The three disguises showing more awkward curves had muscle tremor. An expected correlation. Where "displaced to right" is indicated, it means the horizontal stroke was given more pressure emphasis in the disguised than in the natural style. All cases of increased displaced pressure occurred with more rigid connectives and/or awkwardness in curved strokes. In the other direction, all four writings judged definitely more rigid in connective form had displaced pressure to the right. These correlations are also expected results.

TABLE FIVE: HORIZONTAL EXPANSION

In the following table, overall length is taken to include the left most extent of lead-in strokes and the right most extent of final strokes. Likewise word spacing takes into account the final stroke of "Napoleon" and the lead-in stroke of "Bonaparte." Measurement is the distance between imaginary vertical lines dropped from each of those to the base line. As always in these tables, the comparison is to the natural, undisguised style. An "X" is put into the column applicable to each numbered writer.

TABLE FIVE: HORIZONTAL EXPANSION

WRITER	CHANGE IN TOTAL LENGTH			CHANGE IN WORD SPACING		
	SHORTER	SAME	LONGER	SHORTER	SAME	LONGER
1			X	X		
2		X				X
3	X			X		
4	X			X		
5			X	X		
6	X			X		
7	X					X
8		X		X		
9			X			X
10			X	X		
11	X					X
12		X		X		
13	X				X	

As noted already, dominant slants were considered as left, right or vertical. Two writers used two slants almost equally. We can consider, therefore, the following as the number of writers choosing to change from one of the three slants to another of the three.

Right to left: 2.5

Vertical to left: 2

Right to vertical: 5.5

Right to more right: 2.5

Vertical to right: 0.5

Cumulatively 10 writers chose to change to a more leftward slant and 3 chose to change to a more rightward slant. This seems to indicate people think a left slant is

more of a disguise than a right slant.

The following extensive table shows which other observed features appeared with more of a slant change to the left as opposed to the right. The numbers themselves indicate which unintentional changes might be expected to appear with an intentional change in slant.

STUDIES IN QD: NO. EIGHT

SIGNATURE DISGUISE BY SLANT

TABLE SIX: CORRELATION OF OTHER CHANGES TO SLANT

OTHER CHANGES	SLANT MORE TO LEFT	SLANT MORE TO RIGHT
<u>BASE LINE</u>		
Rises or rises more	8	0
Descends or rises less	0	3
More uneven	8	1
<u>PRESSURE</u>		
No definite change	4	0
Displaced to right	4	1
Lighter	0	1
Muscle tremor	4	0
End more blunted	7	2
End more hooked	2	0

OTHER CHANGES	SLANT MORE TO LEFT	SLANT MORE TO RIGHT
<u>LETTER SIZE/RATIO</u>		
Taller (shorter) upper zone	3 (2)	2 (0)
Taller (shorter) mid zone	1 (1)	2 (0)
Deeper (shorter) lower zone	1 (3)	2 (0)
Wider (narrower) upper zone	5 (2)	3 (0)
Wider (narrower) mid zone	3 (1)	3 (0)
Wider (narrower) lower zone	1 (0)	3 (0)
More retracing	3	1
<u>LETTER CONNECTION</u>		
Wider (narrower) spacing	1 (6)	2 (0)
More connected (disconnected)	0 (3)	2 (1)
More rigid	4	1
Awkward curves	3	0
<u>HORIZONTAL EXPANSION</u>		
Overall length: shorter	6	0
same	3	0
longer	1	3
Word spacing: shorter	6	2
same	0	0
longer	4	1
<u>SLANT</u>		
Genuine shows: nowhere	1	0
upper zone	1	2
mid zone	9	3
lower zone	0	1

OTHER CHANGE	SLANT MORE TO LEFT	SLANT MORE TO RIGHT
<u>SLANT</u>		
Most successful change: on up stroke	0	1
on down stroke	9	1
in upper zone	8	2
in mid zone	1	0
in lower zone	0	0

Under "Connective form" the three listed as having awkward curves are not included in those which are more rigid, though one could reasonably do so. Under "Slant," two writers were equally successful on changing both up and down strokes. One writer with slant change more to the left was not included, because the most success was not according to zone but in the first half of the word. One writer changing to a greater slant to the right was only unsuccessful with the final mid zone letter of each name.

For success of slant change in zones, six on the left side and one on the right side of the table had the second greatest success in the lower zone.

IV. CONCERNING SPEED

Every change in slant had a slower speed than the genuine style did. Each unevenness in the altered writing makes for slower speed, since there must be a readjustment before and after each instance of unevenness. Since, with one exception, no alterations, either the deliberate one in slant or the undeliberate ones in other features, were perfectly successful throughout the signature, there was necessarily a readjustment of writing posture or grip. Alteration in manner of grip and in grip pressure shows most obviously in instances of displaced pressure and blunted or hooked endings. Whenever slant was altered, time was taken to alter the mechanics employed to make the disguised slant. Not only does all this entail slower speed, but it also makes for a more uneven motor sequence.

V. A STUDY BY JAMES REGENT

On p.217 the instructions given participants said in part: "... write ... in your normal handwriting. (NO printing please)" To follow both instructions is impossible for one who normally prints. Thus the samples studied in such cases would be, as it were, disguised by change of style. There is no way to ascertain how much distortion that introduced into the statistical results.

Researches in handwriting often use set passages which people simply are not used to employing in everyday writing. Thus the passage used in the Regent study, being a complex of unaccustomed punctuation, words and expressions, requires mental and graphic adjustment by the writer to reproduce. I believe we should use set passages which would produce no extraordinary problems for the average writer.

The instructions were to make one and only one conscious change in normal handwriting: Slant. That was an excellent idea which was adopted in our study. Unfortunately no data was given for handedness of writers. The slant change to the left was distinguished from that to the right.

He concluded that in order to ascertain that there has been a disguise by slant one must look for parallel features, although he does not use that term. On p.220 he

gives a table of the most often observed changes accompanying deliberate change by slant. These two contributions substantiate findings of experimental graphology. I reproduce his table below.

	DIRECTION OF CHANGE	
	LEFTWARD	RIGHTWARD
Space use	Less	More
Pen pressure	Increased	Varied
Tendency to change style of capitals	Less	Greater
Formation of t-staff	Looped	Retraced
Upper extension of small d	Looped	Looped

VII. A STUDY BY JOHN ALLAN JAMIESON

In the list of features observed, the term "slope" is used to mean both slant of letters and direction of base line. Personally I believe the term "slope" should be banished from handwriting terminology due to that very ambiguity.

On p.119 he says 76.4% of participants changed from a right slant to a left one and 3.6% from a left one to a right one. The remaining 20% increased the direction of their normal slant. However, it is not noted what percentage went more leftward and what more rightward. That would make a big difference in assessing the observations. But then results are not assessed as to the direction of slant change. That vitiates the results, since mechanics of altering slant one way or the other are different.

He noted an overall 61.8% consistency in change of slant. But there is no indication of WHERE writers showed inconsistency, something critically important in recognizing disguise and in making an identification.

He emphasizes that 100% of the writers used the same master pattern in letter formation, and thus change of slant did not prevent identification. This proves nothing at all, since the instructions explicitly stated participants were to write in their normal handwriting. When one does a

controlled study, one must not draw conclusions from what necessarily results from the very controls employed.

On p.121 he notes that 34.5% had increased retracing and pen lifts. Our study noted increased retracing but no pen lifts. Disconnection of letters cannot be considered per se as pen lifts. However, he used a full passage, while we used a single name.

Also on p.121 he states that a small change in slant is harder to maintain than a larger one. This should be a subject of future study. In light of Falcon's thesis, one would expect that, whether the change is large or small, the easiest to maintain would be one going an equal number of degrees the opposite side of vertical. If you try it yourself, I think you will probably find it so.

A factor not considered by us, Regent or Jamieson, is angle value. Lee and Abbey define it as the relationship of slant which strokes in the same letter or word have to each other. The thesis is that, if you alter the slant of a letter, the slants of individual strokes within that letter all tend to alter in the same direction to the same degree. Thus their relationship of slant to each other tends to remain the same. This is a most identifying feature.

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IX. ILLUSTRATIONS

On the next five pages appear the writings on which this study is based. The numbers, 1 through 13, correspond to the numbered writers in the various tables. The A sample for each number is the natural style, and the B sample is the disguise by change of slant.

Research studies of handwriting often have few or no illustrations of the samples studied. I believe such studies should provide the reader with copies of all samples which provided data for the reported observations and conclusions. This belief is based on two reasons.

First, in some research reports that reproduce some of the samples studied, I disagreed with the authors stated observations. So if you can see more or better observations in the samples than I saw, it is important that you be given that opportunity. Otherwise you cannot assess the reliability of my observations and interpretations.

Second, the reader can more easily follow the presentation and learn from the text through making the same study of the samples. That will also enable the reader to improve on my performance, if the reader wishes to undertake a similar study. Peer review of a research study is enhanced through having all of the material available.

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1-A

Napoleon Bonaparte

1-B

Napoleon Bonaparte

2-A

Napoleon Bonaparte

2-B

Napoleon Bonaparte

3-A

Napoleon Bonaparte

3-B

Napoleon Bonaparte

4-A

Napoleon Bonaparte

4-B

Napoleon Bonaparte

5-A

Napoleon Bonaparte

5-B

Napoleon Bonaparte

6-A

Napoleon Bonaparte

6-B

Napoleon Bonaparte

7A

NAPOLÉON BONAPARTE

7-B NAPOLÉON BONAPARTE

8-A

Napoleon Bonaparte

8-B

Napoleon Bonaparte

9-A

Napoleon Bonaparte

9-B

Napoleon Bonaparte

10-A

Napoleon Bonaparte

10-B

Napoleon Bonaparte

11-A

Napoleon Bonaparte

11-B

Napoleon Bonaparte

12-A

Napoleon Bonaparte

12-B

Napoleon Bonaparte

13-A

Napaliam Bonaparte

13-B

Napolean Bonaparte
